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(54) APPARATUS FOR THE PRODUCTION OF DIFFERENT CONCENTRATIONS OF LIQUID ANIMAL FEED CONCENTRATES

(71) We, F. WEYHAUSEN & Co. MASCHINENFABRIK GmbH. a German Company, of 291 Westerstede, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to apparatus for the production of different concentrations of liquid animal feed concentrates, especially milk for the rearing and fattening of calves, lambs or the like, including a powder stock container, a liquid container, a mixing vessel in which the powder and water are mixed, and at least one supply line between the mixing vessel and at least one nipple.

Devices of the above-mentioned type have previously only been suitable for the production of one liquid concentrate. If, for example, two or more milk concentrates are to be available for the rearing of calves of different ages, it has hitherto been necessary to erect a corresponding number of appliances due to which there is a considerable increase in the space needed and the total costs. Furthermore, the care of the animals is made more complex.

The invention seeks to avoid this disadvantage and provides apparatus in which two or more concentrates can be made without substantially increased technical expenditure.

According to one aspect of the present invention apparatus for the production of different concentrations of liquid animal feed concentrates comprises a storage container for the powder, at least one liquid container, a mixing vessel to receive predetermined amounts of powder and liquid, at least one outlet from the mixing vessel communicating with a nipple and means for varying the liquid content of the concentrate flowing from the mixing vessel to regulate the concentration of the concentrate at the nipple.

According to another aspect of the present invention apparatus for the production of different concentrations of liquid animal feed concentrates comprises a mixing vessel adapted to receive and mix predetermined amounts of powder and liquid from respective containers, a supplementary liquid container connected to a source of liquid and a mixing device adapted to receive and mix liquid and concentrate from the supplementary liquid container and mixing vessel, respectively, means for regulating the liquid flow from the supplementary liquid container, the output of the mixing device being connected by at least one supply line to at least one nipple.

Thus, the mixing device enables the concentrate prepared in the mixing vessel to be diluted and thus adjusted to different concentrations. The mixing device is of such simple construction that the total cost of the apparatus is only increased to a slight extent. A further advantage of the invention is that, owing to the simple construction, several supplementary mixing devices can be attached to one apparatus, so that two, three or more concentrates can be prepared without increasing the external dimensions of the apparatus.

According to one embodiment the source of liquid comprises an additional liquid container and a regulating valve is disposed between the supplementary liquid container and the mixing device.

By varying the amounts and temperatures of the liquids flowing from the two liquid containers, the concentrate from the mixing vessel and the liquid from the supplementary liquid container can be so mixed in the mixing device that a desired temperature of the final concentration is achieved at the nipple. Therefore the further advantage is obtained that, for example, types of milk powder may be used which only dissolve sufficiently at high temperatures, because the hot milk solution thereby formed can be cooled as desired by subsequent addition of cold water from a second water container.

According to a further embodiment, two liquid containers are provided which deliver

liquid directly into the mixing vessel. In this case, the supplementary liquid container may then be discarded. One of the liquid containers may contain a heating and/or a cooling device.

The invention will be further described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 shows diagrammatically a vertical section of a first embodiment of apparatus for providing different concentrations of liquid concentrates,

Fig. 2 shows diagrammatically a vertical section of a second embodiment, and

Fig. 3 shows diagrammatically a vertical section of a third embodiment.

The apparatus illustrated in Fig. 1 has, inside a housing of steel plate, plastics or the like, a cold water connection 1, through which the service water is fed via a valve 2 into a water container 4. A float 3 in the latter controls the valve 2. A heater 5 controlled by a thermostat 6 is disposed in the water container 4 and heats the water to a desired temperature. The warm water flows into a pipe 7, through a solenoid operated valve 8 and a regulating valve 9 and then through a pipe 10 and via a water distributor 19 into a mixing vessel 20, where it is mixed with milk powder fed in simultaneously by a paddle mixer 21, which is driven by a motor 24.

The milk powder is contained in a funnel-shaped stock vessel 13 and is loosened from this by a spring stirrer 14, whereupon it arrives, via a vertical spiral conveyor 15, on a scatter plate placed coaxially below the stock container. From the scatter plate the milk powder is fed by a stripper 17 via an agitator blade 16 to a vertical spiral conveyor 18, which passes the powder into the mixing vessel 20.

For the purpose of controlling its filling capacity, the mixing vessel 20 is suspended on a form of balance 11, on the free arm of which the capacity of the vessel 20 can be adjusted by means of a counterweight 26. An additional control of the feed of milk powder may be obtained, for example by inserting a different spiral conveyor 15 with a larger or smaller pitch.

When milk is sucked through the nipple 23a and the tubing 36, the total weight of the mixing vessel and its contents decreases, whereby the counterweight 26 actuates the balance 11. The stirrer motor 24 and the conveyor motor 25 are actuated by a microswitch 12 and in consequence fresh milk powder is fed in. The solenoid valve 8 simultaneously opens and liberates the required amount of water through the regulating valve 9.

An additional device serves for the production of a different concentration of milk solution for a second nipple 23b. A pipe 27 is connected to the water pipe 7. Warm water passes through the pipe 27 and via a stopcock 28 and a valve 29 into a supplementary water container 31. A float 30 situated in the supplementary water container 31 controls the valve 29.

The water is sucked from the supplementary water container 31 through a regulating or stop valve 32 and is fed via a tube 33 bent into a deep U-shape to a forked tube 34, the other branch of the fork of this tube being connected through a pipe 22 to the mixing vessel, and the off-flow tube of the fork is connected through a pipe 35 to the second nipple 23b. By means of the U-shaped tube, overflowing of the milk into the supplementary water-container 31, and, conversely, overflowing of the water into the container 20, are prevented. When an animal sucks the nipple 23b, then both water from the U-shaped tube 33 and milk concentrate from the pipe 22 are sucked through the pipe 35, being mixed together in the forked tube 34 and supplied to the nipple.

Thus, with this embodiment, two milk solutions of different concentrations are obtainable at the nipples 23a and 23b. The strength of the concentrate in the pipe 35 can be selected either by regulation of the supply of water by means of the regulating valve 32 or by bores of different sizes in the forked tube 34.

It is readily possible to increase the number of nipples by making branches in the pipes 35 and 36. By inserting further supplementary water containers 31 in the apparatus, several concentrates of differing concentrations may correspondingly be obtained.

In the embodiment of Fig. 2, a second water container 37 is provided, from which the supplementary water container 31 is fed, which therefore is separate from the water container 4. The water from the water container 37 arrives via a pipe line 39 into the supplementary water container, and a stopcock is arranged in the pipe line 39. Here also, a valve 29 is provided in the pipe line at the inlet into the supplementary water container, which valve 29 is controlled by a float 30.

The water container 37 may also be filled with another liquid, for example milk, so that when a mixture of pure natural milk and synthetic milk is obtained at the nipple 23. In the water container 37 or in the supplementary water container 31, a heating or cooling device can be placed, so that it is possible to produce different temperatures in the supplementary water container 31 and/or water container 37 on the one hand, and in the mixing vessel 20 on the other hand. Consequently, it is possible to combine the individual temperatures of the component streams of liquid so that the desired sucking temperature is always present at the nipple 23.

When, for example, a milk powder is to be used which only dissolves at a very high temperature, this may be dissolved in the mixing vessel 20 with very hot water from the water

container 4 and then the sucking temperature may be reduced again to the desired extent by addition of colder water from the supplementary water container 31. In detail, the temperature is controlled by mixing the water from the supplementary water container and the concentrate from the mixing vessel entering the forked tube 34 in amounts determined by the bores of the pipe lines or by the adjustment of the regulating valve 32.

In the construction of the apparatus according to Fig. 3, the supplementary water container 31 is omitted and the pipe line 39 of the water container 37 opens directly from above into the mixing vessel 20. Here then the mixing process takes place in the mixing vessel and not, as before, in the forked tube 34. The amount of liquid running from the water container 37 is in this case determined by a timing valve 38 disposed in the pipe line 39. The valve 38 opens for a set time to allow water to enter the mixing vessel, thereby diluting the contents of the vessel to a desired concentration and cooling the contents, if hot, to a desired temperature. In the embodiment of Fig. 2 also, several possible concentrations for different nipples can be produced by use of forked parts 34 (Fig. 1) and by use of further water containers 37.

WHAT WE CLAIM IS:—

1. Apparatus for the production of different concentrations of liquid animal feed concentrates from mixtures of powder and liquid comprising a storage container for the powder, at least one liquid container, a mixing vessel to receive predetermined amounts of powder and liquid, at least one outlet from the mixing vessel communicating with a nipple and means for varying the liquid content of the concentrate flowing from the mixing vessel to regulate the concentration of the concentrate at the nipple.

2. Apparatus for the production of different concentrations of liquid animal feed concentrates comprising a mixing vessel adapted to receive and mix predetermined amounts of powder and liquid from respective containers, a supplementary liquid container connected to a source of liquid and a mixing device adapted to receive and mix liquid and concentrate from the supplementary liquid container and mixing vessel, respectively, means for regulating the liquid flow from the supplementary liquid container, the output of the mixing device being connected by at least one supply line to at least one nipple.

3. Apparatus as claimed in claim 2 in which the mixing vessel is connected by at least one further supply line to at least one further nipple.

4. Apparatus as claimed in claim 2 or 3 in which the mixing device comprises a forked tube.

5. Apparatus as claimed in claim 2, 3 or 4 in which the supplementary liquid container is connected to said source of liquid by a pipe, a valve being disposed in this pipe, which valve is controlled by a float located in the supplementary liquid container.

6. Apparatus as claimed in any one of claims 2 to 5 in which the mixing vessel and the supplementary liquid container are located at substantially the same height, the connection between the supplementary liquid container and the mixing device being bent in an inverted U-shape the curved end of which is above the level of the liquid of the supplementary liquid container and of the mixing vessel.

7. Apparatus as claimed in any one of claims 2 to 6 in which the liquid container acts as said source of liquid for the supplementary liquid container.

8. Apparatus as claimed in claim 2 in which said source of liquid comprises an additional liquid container.

9. Apparatus as claimed in any one of claims 2 to 8 in which a regulating valve is disposed between the supplementary liquid container and the mixing device.

10. Apparatus as claimed in claim 1 comprising two liquid containers communicating directly with the mixing vessel through respective pipes, and an electrical timing valve provided in one of said pipes.

11. Apparatus as claimed in claim 8 or 10 in which one of the liquid containers contains a heating and/or a cooling device.

12. Apparatus as claimed in any preceding claim in which the liquid is water.

13. Apparatus constructed, arranged and adapted to operate substantially as hereinbefore particularly described with reference to and as illustrated in Fig. 1 of the accompanying drawings.

14. Apparatus constructed, arranged and adapted to operate substantially as hereinbefore particularly described with reference to and as illustrated in Fig. 2 of the accompanying drawings.

15. Apparatus constructed, arranged and adapted to operate substantially as hereinbefore particularly described with reference to and as illustrated in Fig. 3 of the accompanying drawings.

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1,223,754 COMPLETE SPECIFICATION
3 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEET I

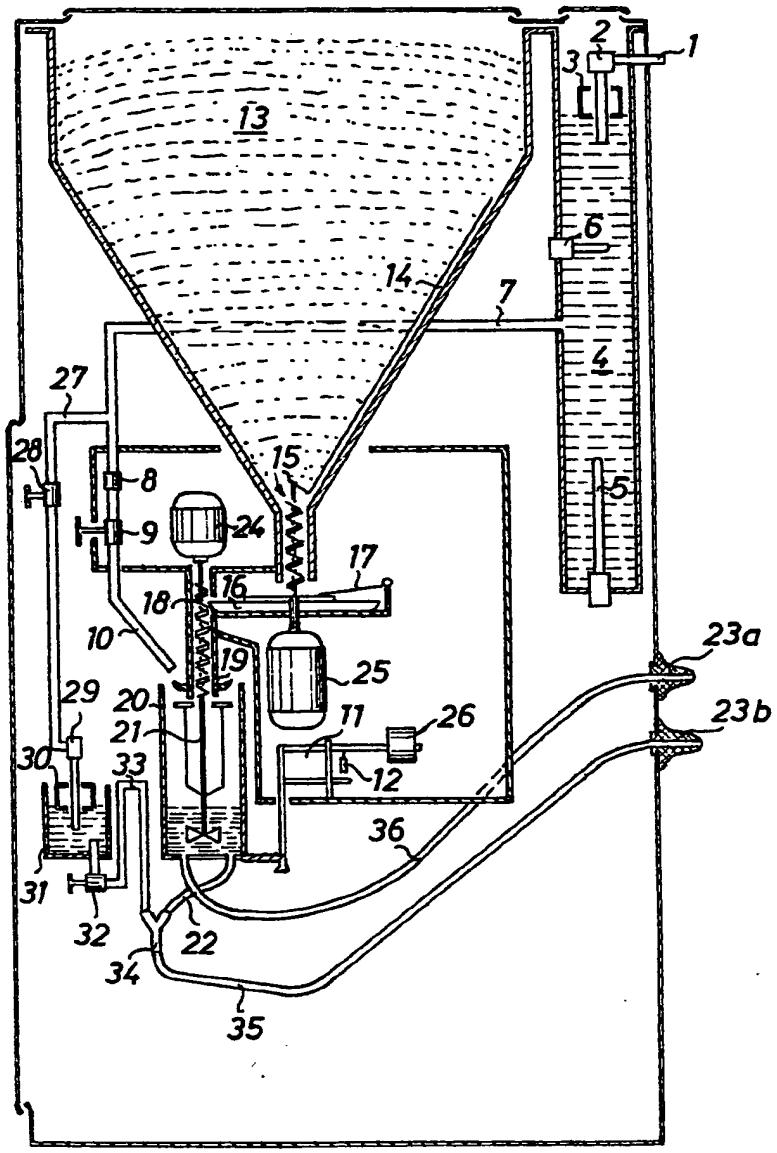

FIG. 1

1,223,754 COMPLETE SPECIFICATION
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SHEET 2

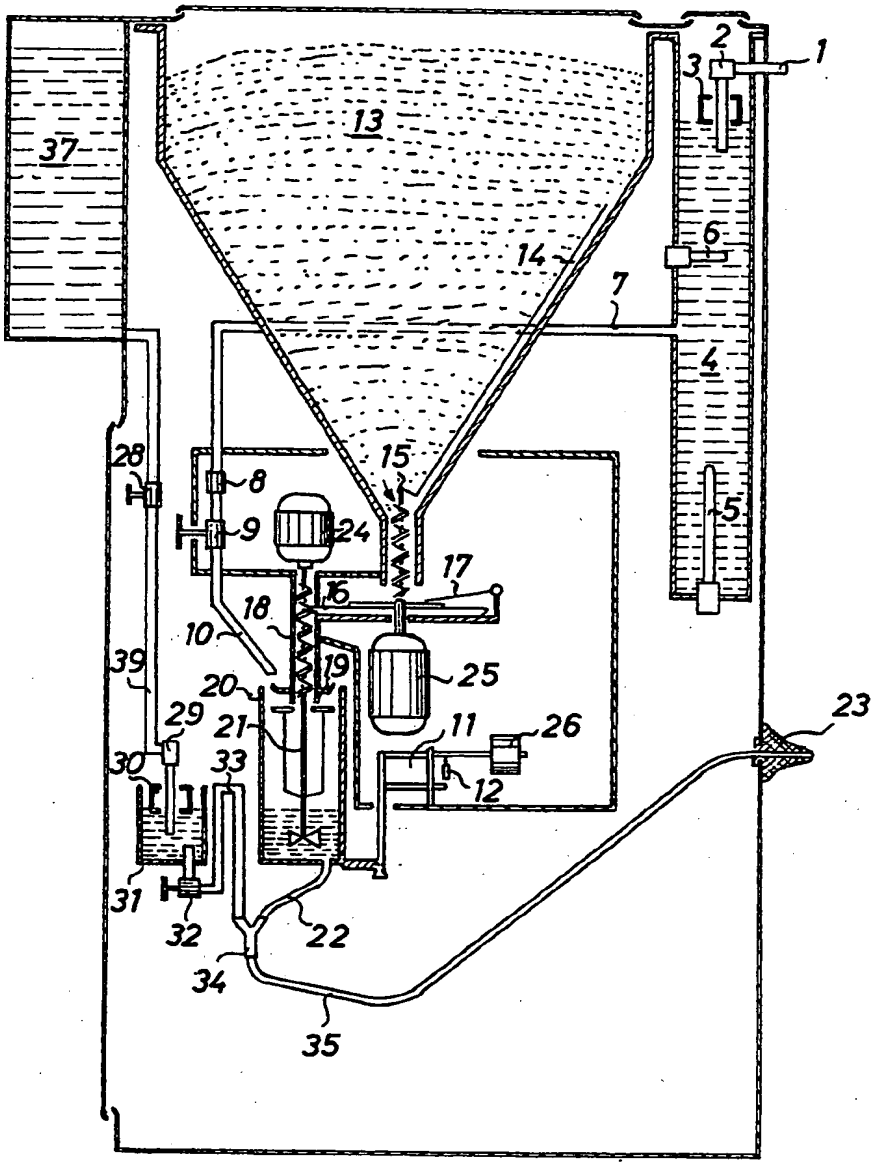

FIG. 2

1,223,754 COMPLETE SPECIFICATION
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SHEET 3

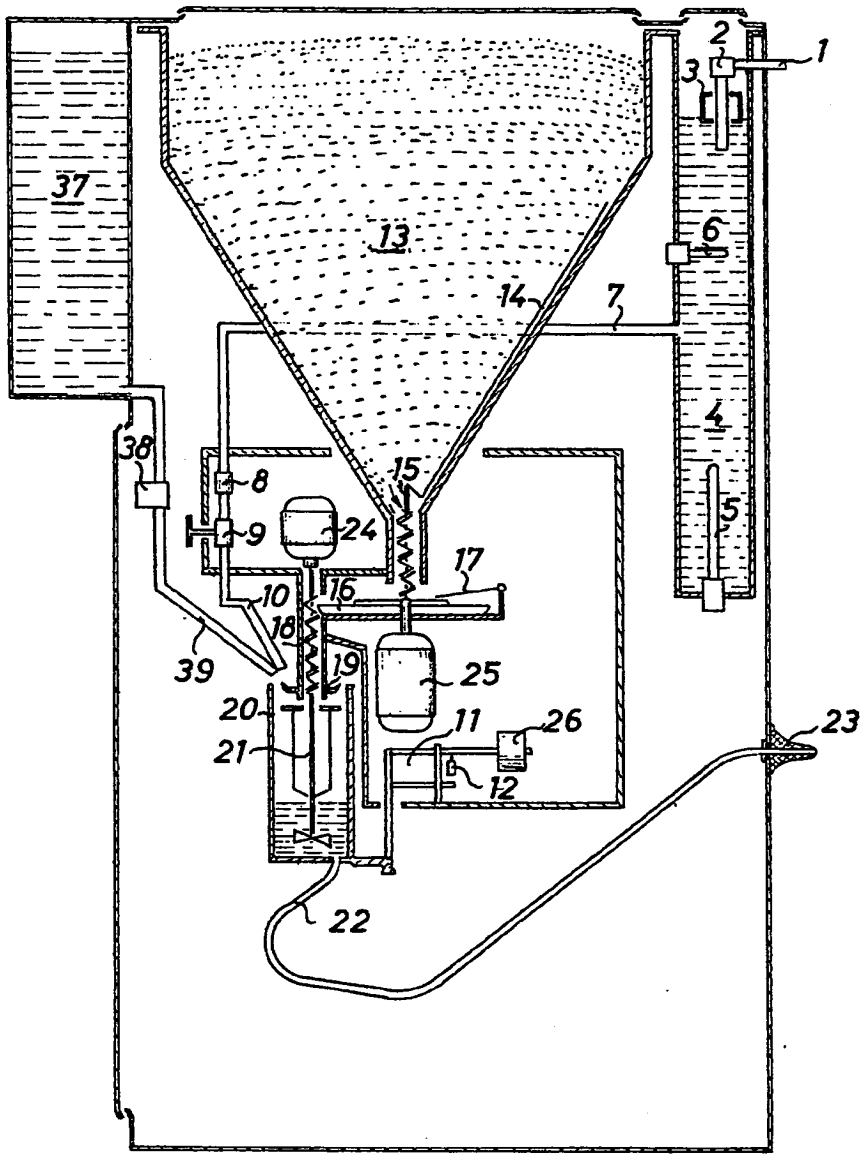

FIG. 3